



Yoga and cognition: Exploring its benefits for elderly population

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Abstract

Cognitive decline is a well-known consequence of ageing, affecting multiple domains including memory, attention and processing speed among others. Global ageing combined with a threefold increase in the number of people suffering from dementia by 2050 presents an exigent demand for effective, safe and accessible approaches to supporting cognitive health. Medications offer only modest benefits and are often inappropriate in frail older adults, while non-drug approaches such as yoga have garnered increasing interest. This narrative review summarizes evidence from randomized clinical trials, quasi-experimental studies and long-term observance research on the effect of yoga-based interventions on cognitive function in older governance. The searches were performed across full-text English articles using the keywords such as "Yoga" and "Cognitive functions," with considerations towards some other word variations associated to cognitive function (cognition) in elderly population related aging from PubMed, ScienceDirect, Scopus, Shodhganga and Google Scholar. Screening and eligibility assessment resulted in the selection of twelve studies for qualitative analysis. Results Top-line results indicate that yoga enhances executive function and attention, working memory, processing speed as well as episodic memory to some extent. Grouped yoga practices (asanas practising, pranayama methods, meditation and the accompanying trataka and relaxation) reliably improved cognitive function in both healthy elderly individuals and patients with mild cognitive impairment. Multiple studies also show that yoga has specific benefits over regular exercise in the areas of mood, resilience and overall wellbeing. Evidence trends support yoga as a holistic, cost-effective and accessible strategy to promote healthy cognitive aging with respect type of intervention duration studied. The application of structured yoga programs in elder care facilities, or as a part of home routine may potentially counteract age-associated cognitive decline and increase the quality-of-life among older adults.

Keywords: Yoga, yoga module, cognitive function, executive function, elderly population

Introduction

This means that global population is undergoing demographic transition (United Nations, n.d. Progress in development has seen mortality from many lethal infectious diseases consistent, with all places remaining under the threshold of making people die. By 2050, the average life expectancy around the globe is expected to be 77 years (GU, Andreev & Dupre; 2021) ^[2]. Because the populace is ageing promisingly, by 2080 folk aged sixty and higher will be more than those old beneath eighteen. To respond to this demographic shift, developing countries need to improve the quality of life for their elderly population (United Nations n.d.) One area of concern surrounding aging is the health and function of elderly people. Further common concerns include general health deterioration, loss of independence and decrease in mobility and physical faculties; as well as cognitive decline. The increasing life span of humans is accompanied by common issues such as memory deficits, loss in attention, slowed down cognitive processing and losses in planning & decision making abilities (Khan *et al.*, 2024) ^[27]. More than 55 million people around the world currently live with dementia (World Health Organization, 2023) ^[7], and this number is projected to increase threefold by 2050.

Cognitive performance is how well one thinks, remembers, focuses and concentrate as well as take decisions to understand what they need to do or able complete a task (Harvey, P.D. 2019) ^[4]. Prevalence of cognitive decline across elderly populations is shown in Table 1. Aspects of

cognition and their functional relevance in aging is given in Table 2.

Table 1: Prevalence of Cognitive Impairment and Subjective Cognitive Decline across Elderly Populations

Cognitive Status	Population studied	Occurrence%
Cognitive Impairment	Rural elderly	44.5
Self- reported cognitive decline	Globally (subjective decline)	40
Cognitive impairment	Indian elders	13.7
Cognitive impairment	Elderly population globally	19

Dementia and other cognitive disorders affect older people's independence and quality of life, but also generate emotional burden on families as well as financial strain for the health care system. Medications targeting cognitive decline are not very effective. Most treat symptomatic rather than the underlying disease and have side effects that may be troublesome for frail elderly patients. As a result non-pharmacological strategies such as exercise, diet and mind-body therapies have received much attention in promoting cognitive health (Barnes *et al.* 2023) ^[5]. Of these, yoga is becoming increasingly popular as it has wide-ranging physical and mental health benefits for older adults. Yogic scriptures always represent yoga as a holistic approach towards liberation from pain through the mind, body and spirit connection. The methods and emphasis may be different, but the fundamental intention is to phenomenalise mind into form-following energy, thus creating balance at one with universal existence.

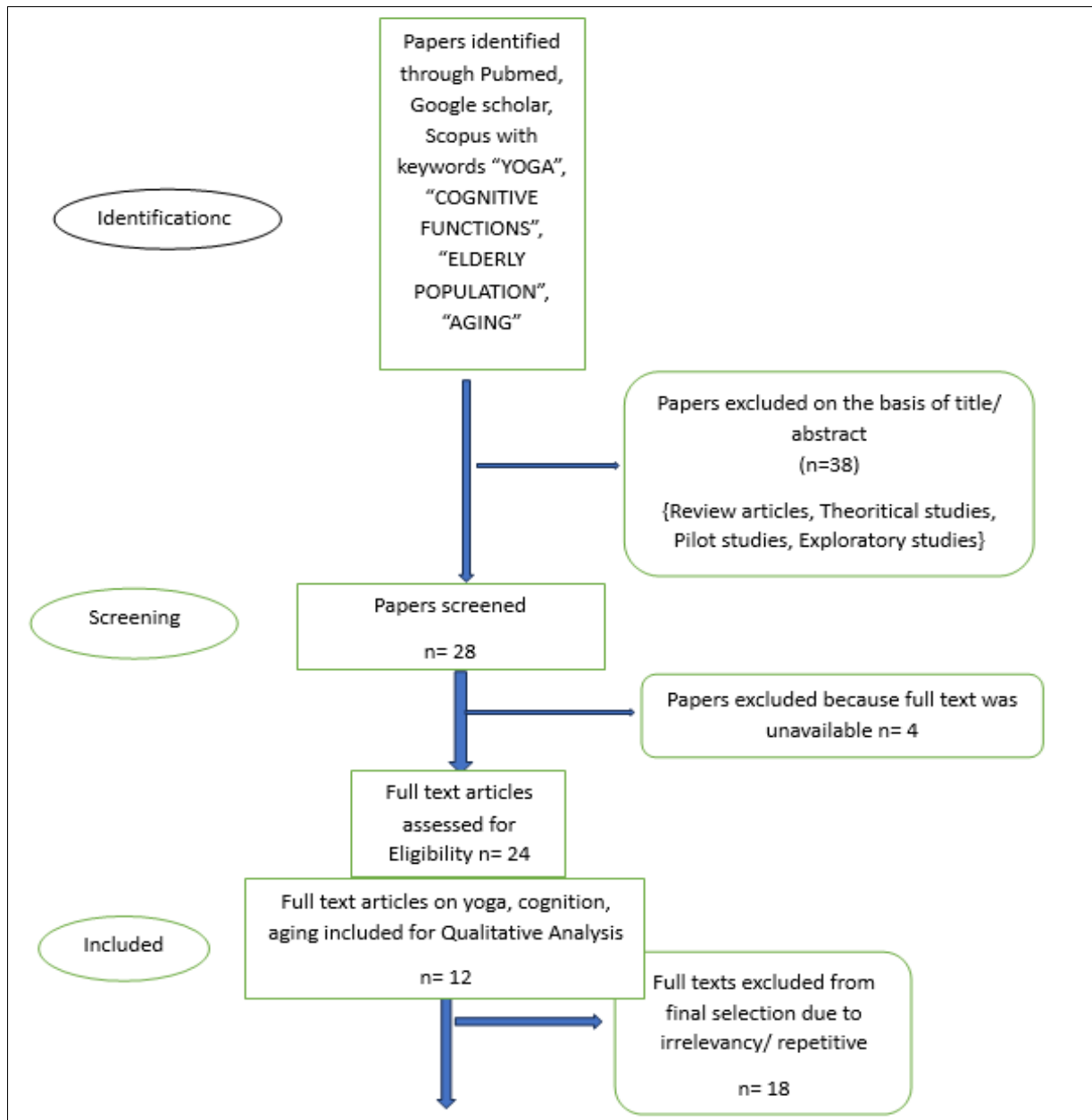
Table 2: Cognitive Aspects and Their Functional Relevance in Aging

Cognitive Aspect	Definition	Role in Everyday Life of Elderly
Memory	Ability to store and retrieve data	For medication, maintaining independence
Executive functions	High level of cognitive process includes problem solving, decision making, flexibility	For navigation, driving and independent living
Visuospatial ability	Helps to perceive surrounding environment, integrate and analyze visuals in our thinking	For managing finances, adapting to new situations, medications
Attention	Ability to focus on a stimulus ignoring others	Decline can impair communication, safety and ability to do daily task
Processing speed	The speed at which a person can perceive, interpret, respond to an information	Impacts decision making, reaction time
Psychomotor ability	Physical movement that needs to be coordinated with cognitive process	Decline impacts mobility, fall risk

Methodology

The study follows a qualitative review approach. Academic articles were identified by conducting a systematic search of English-language databases, including Google Scholar, Shodhganga, PubMed, and ScienceDirect, using pertinent keywords such as “Yoga”, “Yoga module”, “Cognitive

Functions”, “Executive functions”, “Elderly Population”, “Aging”. The studies included in this review are summarized in table which outlines study designs, sample sizes, yoga interventions, outcomes assessed and the resulting changes after assessment for cognitive performance and aging.

**Fig 1:** Flowchart of Data Search

Results

Citation Details	Study Design+ Sample	Interventions	Cognitive Aspects Assessed	Results & Conclusion
Bhattacharyya <i>et al.</i> (2021) ^[13]	Secondary analysis of the MIDUS population-based longitudinal cohort; n = 2,097 participants who completed Waves 2 (2004–05) and 3 (2013–14)	No treatment is given. Movement based mind body practices are independent variables.	Executive function and Episodic memory	MBP slightly reduced episodic memory but not executive function
Chobe <i>et al.</i> (2022) ^[14]	Non-randomized three-arm clinical trial on 72 elderly population (average age 63.3 ± 6.44 years)	Ayurveda Rasayana (n =23) Integrated Yoga(n=25) Combined intervention (n = 24) for 8 weeks Yoga module included: Starting Prayer, Sukshma Vyayama, Breathing Exercises, Asanas, Relaxation techniques, Pranayama, OM Chanting Closing prayer and Sankalp	Executive function, attention, processing speed, and memory (working and short-term memory) learning and verbal memory, and verbal fluency.	Both Ayurveda Rasayana and Integrated Yoga treatments were effective in enhancing cognitive functions in elderly individuals with mild cognitive impairment (MCI). The combination of Ayurveda Rasayana and Yoga interventions led to significantly greater improvements in learning, attention, processing speed, and working memory compared to either treatment alone in elderly people with MCI.
Vaezi <i>et al.</i> (2018)	Randomized, controlled clinical trial on 58 elderly women (29 in intervention group, 29 in control group)	8 weeks of intervention Three 1-h sessions per week Stretching and rotating Joints, Asanas: (standing up, strengthening the muscles of the arms, sides, and legs) Pranayama: Easy (normal), abdominal (diaphragmatic), chest, and clavicular breathing, moon-sun, Savasana: Meditation mode	Memory	The scores of memory increased for intervention group and not for control group. Thus, to improve the memory of the elderly, physical activity such as yoga exercise can be helpful.
Baklouti <i>et al.</i> (2022) ^[16]	Cross-sectional study on 30 healthy older men	Yoga group (n=15): Twice-weekly 60-minute sessions for 2 years included Sukshnavyayam, Asanas (standing, prone, supine), Pranayama, meditation Control group (n=15): No intervention	Selective attention, sustained attention, episodic memory, and processing speed.	Long term practice of Hatha yoga showed positive results concerning executive functions and reaction time. However, no significant differences were observed between the two groups in episodic memory and sustained attention.
Talwedkar <i>et al.</i> (2014)	60 participants Randomized block design was used	Trataka group: n=34 practiced trataka for 26 days which included Preparatory eye exercises, Jyoti trataka, De-focusing, silence, breathing, chanting Waitlist control group: n=26	short-term memory and working memory, selective and focused attention, concentration, visual scanning as well as activation and inhibition of rapid responses and executive functions	The results of this study showed that Trataka can be used as a technique to enhance cognition in the elderly
Gothe <i>et al.</i> (2017) ^[18]	Randomized Control Trial on 118 participants of mean age 62 years	8-week intervention Hatha yoga group and stretching control group	Cognitive functions including attention and processing speed	Yoga practice lead to improved attentional and information processing abilities
Grzenda <i>et al.</i> (2024) ^[19]	Randomized controlled trial(N=47) Older women aged 55 years or above at risk for Alzheimer disease	60-min sessions over 12 weeks Kundalini yoga (n=40): Tuning in, warm up, pranayama, kirtan kriya (12 min recording), savasana, closing 60-min sessions over 12 weeks Memory training (n=39)	Primary outcomes are Cognitive domain scores (delayed recall, executive function) and subjective memory scores	Findings suggest that KY can have a positive impact on subjective cognitive decline in older adults at increased risk for cognitive decline.
Oueslati <i>et al.</i> (2025) ^[20]	Randomized Controlled Trial, 45 healthy older adults aged between 65 and 80 years.	3 groups: With two sessions per week lasting 45 min each. Yoga group (n=15) Physical activity group (n=15) Control group (n=15)	Attention, memory and reasoning	12 weeks of two 45-min yoga sessions per week significantly improved attention, memorization and reasoning among older adults
Hariprasad <i>et al.</i> (2013) ^[21]	87 residents of elderly homes (yoga=44, waitlist control group=43)	Sukshnavyayam, Yogasana, Pranayama and meditation in the form of OM chanting, 60 mins. for 6 months (3-4 times per week)	Verbal and visual memory, attention and working memory, verbal fluency, executive function and processing speed	Yoga based-intervention are beneficial to improve several domains of cognitive function in elderly living in residential care homes
Eyre <i>et al.</i> (2017) ^[22]	A randomized controlled trial on 81 Older participants (≥55 years of age) with MCI	12-week intervention The KY group (n= 39) engaged in a 60-minute KY class per week, and a daily 12-minute KK meditation MET group (n=42)	Cognitive (i.e. memory and executive functioning) and mood (i.e. depression, apathy, and resilience)	The KY group demonstrated both short-term and long-term enhancements in executive functioning compared to the MET group, along with more extensive improvements in depressed mood and resilience
Chatterjee <i>et al.</i>	Quasi-Experimental Study on 86 middle aged participants	12 Weeks Yoga group (male 21 and female 18): Practiced suryanamaskar, kriyas, asanas, pranayamas, and Dhyana Waitlist control group (male 20 and female 18): normal routine activities	visual reaction time (RT), auditory RT (attention and alertness), and short-term memory	attention-alertness and short-term memory improved after 12 weeks of yogic intervention
Oken <i>et al.</i> (2006) ^[24]	Randomized, controlled trial on 135 healthy participants aged 65- 85 years	6-month intervention Yoga group Exercise group Waitlist control group	cognitive function, fatigue, mood, and quality of life	There were no relative improvements of cognitive function among healthy seniors in the yoga or exercise group compared to the wait-list control group

Executive Functions

The most studied type of cognition was executive function, which includes abilities such as planning and flexibility, self-control or inhibition (or lack thereof), problem-solving or reasoning. Eyre *et al.* A randomized controlled trial of a 12-week course of Kundalini yoga compared to memory enhancement training in older adults with mild cognitive impairment (MCI) was run by R. Karp *et al.* (2017). Those who practiced yoga showed greater improvements in executive function, mood and resilience than those doing the control. Likewise, Hariprasad *et al.* (2013) ^[21] showed that yoga not only increased cognitive flexibility but also fluency and attention among elderly living in care homes.

In another study, Xu *et al.* Built on this idea, Zeng *et al.* (2023) combined tai chi with transcranial direct current stimulation which led to significant improvements in executive function and cognition, thus indicating that pairing movement-based mind-body exercise together with the modulation of neurostimulation may have synergistic effects leading to improved cognitive performance within 5® activities ^[7]. Executive function was the cognitive domain that yielded most affected by yoga.

Working memory

The second most assessed domain was working memory, or the ability to hold and manipulate information. Studies by Hariprasad *et al.* (2013) and Chobe *et al.* (2022) ^[14, 21] showed that older adults who underwent 12 to 24 weeks of yoga practice functioned better on memory recall and learning tasks compared with similar control groups. McDougall *et al.* (2015) ^[25] showed that memory training alone is not enough to boost brain power, but combining yoga with asanas and pranayama retrains the brain for more effective recall and improved responsibility. These results suggest that in yoga working memory performance is enhanced by improved attention control and mental concentration.

Attention and Processing Speed

All but 2 randomized controlled trials and quasi-experimental studies assessed attention and processing speed. Chatterjee *et al.* studied how 12 weeks of daily yoga practice may improve alertness and selective attention in middle-aged adults (2021). Baklouti *et al.* Interestingly, individuals who practiced Hatha yoga 72 over a long-term period had faster reaction times and processing speed 66 than those not practicing yoga (2022). Lenze *et al.* According to (2022) mindfulness meditation is comparable to aerobic exercise since both result in enhanced attention, possibly through similar mechanisms involving the decrease of stress and an increase in cerebral blood flow. Improvements in processing speed were far less consistent between studies, and some even demonstrated no effects at all - potentially because the interventions only lasted a short time.

Episodic Memory

The least represented area of cognition was episodic memory, involving remembering personal experiences and events. Hariprasad *et al.* A recent study by Gothe *et al.* (2013) ^[21] showed some improvements on verbal recall in older adults after yoga practice, while a meta-analysis conducted to compare the effects of yoga and going for walks on cognition concluded that evidence does not

support the use of these two physical interventions as effective strategies ^[19]. Conversely, Baklouti *et al.* A meta-analysis examining no significant differences between yoga and control groups (2022) However, Bhattacharyya *et al.* (2021) ^[13] found that practising yoga or tai chi over 10 years was associated with a more gradual decline in episodic memory. These results suggest that yoga might protect memory longer term, although more research is needed

Discussion

Aging is the gradual degradation of the normal functional processes. Over the years, our cells, tissues and organs slowly lose some of their ability to function as they did when we were younger. This decline increases the risk of chronic diseases, cognitive impairment events, physical impairments and more (Li *et al.* (2021)).

Stated differently aging is what actually makes many diseases happen. Older individual shows a lot more numerous disorders like cognitive decline, cardiovascular illness, diabetes and also impaired immune feature largely because of the fact that our physical body discontinues operating proactively as we acquire older (Zhao *et al.* (2024) ^[27]).

Research studies have also repeatedly shown that yoga slows age-related declines in cognition and is a vehicle for healthy ageing.

New research highlights the possibility of yoga as a helpful method to preserve cognitive health among older adults. Oueslati *et al.* In a randomized controlled study, Li *et al.* (2025) ^[20] investigated the effect of 12 weeks Hatha yoga program on cognitive domains such as attention, memory and reasoning in older adults at retirement home setting. This study was appropriately designed with random assignment, an active exercise comparison group and a sedentary control group. Crucially, the yoga group showed significantly improved performance in all of the cognitive measures compared to both exercise and control groups, suggesting that there may be unique benefits specifically attributable to engaging in a yoga practice outside those expected from simply being active or sedentary. Gothe *et al.* A randomized controlled trial in sedentary, healthy old individuals compared an 8-week Hatha yoga program incorporating postures, breathing and meditation (Yoga group) with stretching and strengthening exercises (Control group), finding a beneficial effect for the former on attention-related performance indices of reaction time. The findings came from tasks assessing sustained attention, information processing magnitude and perceptual comparison and point to yoga as a potential mechanism for enhancing attentional control or cognitive processing efficiency in this group (Sukhachova *et al.*, 2023). Another study, Eyre *et al.* Many of the existing literature compare KY to MET like in Hurria and others (2017) ^[18] a well-controlled randomized controlled study that examined the effects of compared KY vs. KY treatment improved memory in all patients compared to the placebo group but also showed more pronounced and durable benefits in many additional areas, including executive function, mood and resilience. Strengths of the study included use of an active gold-standard control, rigorous blinding procedures and a comprehensive assessment battery for cognitive and emotional outcomes. Notably, those assigned to the KY group showed pronounced and sustained improvements in executive functioning (and depressive symptoms) but not

cognitive function indicating unique effects of yoga-based mind-body exercises on very late life cognitive aging. A randomized controlled trial by Talwedkar *et al* Investigated the effects of one-month trataka practice on cognition in older adults with a wait-list control group (2014) ^[17]. Intervention was comprehensive including preparatory eye movements, focused and unfocused gazing sessions in a situated environment; also breathing techniques and chanting performed daily to enhance consistency/participant compliance. Trataka produced significant improvements compared to control group on short-term memory, attention and concentration as well executive functions from standardized administration of neuropsychological assessments in this study. Notably, these cognitive improvements emerged only after a month of practice and not following an individual session – underscoring the need for sustained yoga intervention for cognition benefits. Hariprasad *et al.* (2013) ^[21] studied cognitive effects of a structured yoga program among older adults residing in care homes over 6 months. The instructor was approved and the practice comprised of postures, breathing techniques, and meditation. Findings indicated improvement in the immediate and delayed recall of verbal memory, visual memory retention, attention span/working executive functioning/executive processing speed among people who received the yoga intervention as opposed to a waitlist control group.

Conclusion

This narrative review suggests that yoga is a prospective, safe and economical non-pharmacological intervention for the maintenance and/or improvement in cognitive function among older adults. In conclusion of the inverse there are suggestive effects in cognitive domains and message through executive function, attention working memory processing speed episodic memories however across reviewed studies regular yoga each surprisingly utility was negligible. In either population, notable cognitive benefits were consistently associated with interventions employing a combination of asanas (yoga poses), pranayama (breath control), meditation, relaxation techniques and yogic cleansing practices.

In addition to cognitive enhancement, a number of studies also reported improvements in mood, resilience and overall psychological well-being confirming that yoga has multidimensional benefits through compounded effects on physical, psychological and neurophysiological health. These results add to a growing body of evidence that mind-body interventions might promote healthy brain aging through stress buffering, improved autonomic regulation and increased neuroplasticity. Nonetheless, the literature is heterogeneous with regard to study design, intervention protocols/durations and populations included in each trial as well as types of cognitive outcomes assessed which impedes direct comparisons between studies or establishing standardized clinical practice recommendations.

Future studies are warranted using large-scale multicenter randomized controlled trials with standardized yoga protocols, longer intervention durations and detailed neuropsychological and neurobiological evaluation. Including neuroimaging, electrophysiological and other markers of central nervous system plasticity may further clarify the biological mechanisms responsible for yoga-

induced cognitive enhancement while also strengthening evidence upon which clinical recommendations are based.

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